GEOGRAPHICAL DISTRIBUTION OF TORNADOES IN ARKANSAS

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Persons discussing tornadoes often are concerned with the geographical distribution of the storms within their State. Some of the questions include: Where have tornadoes occurred in the State? What sections are most subject to tornadoes? What are the chances for my city, my farm, or my home being damaged or destroyed? The purpose of this note is to present some data that bear on these questions as applied to the State of Arkansas. The number of tornadoes on record is however, an inadequate sample on which to base definite answers. A tabulation of all tornadoes on record in Arkansas has recently been completed [1]. It includes all occurrences on record as far back as 1823. The data from the tabulation form the basis for this paper.

Tornadoes have been reported in all sections of Arkansas. Figure 1 shows the distribution of tornadoes by counties. The upper figure shows the number of tornadoes reported in each county, and the lower figure in italics shows the number of tornadoes per unit area of 100 square miles. The number of tornadoes recorded ranges from 1 in Marion County to 29 in Pulaski County, and the number of tornadoes per unit area of 100 square miles ranges from 0.2 in Marion County to 3.7 in Pulaski County. The sum of the tornadoes by counties as shown in figure 1 is considerably greater than the total number of tornadoes on record in the State, since many storms crossing county lines have been counted separately for each country affected.

It is evident that more tornadoes have been reported in more populated areas and the least in the rural, mountainous, or forested sections. There is a positive correlation ($r=0.45$) between the number of tornadoes per unit area and the population by counties. The correlation is not too reliable because of the relatively small number of cases upon which to make comparison (probable error is 0.09). Other factors modifying the relationship are the percentage of rural and urban population, population changes, availability of communication facilities by which tornadoes could be reported, and the period of record for reported tornadoes. Some counties, such as Pulaski, have more tornadoes recorded partly due to a longer period of record. For example, three tornadoes in the Little Rock area (Pulaski County) in

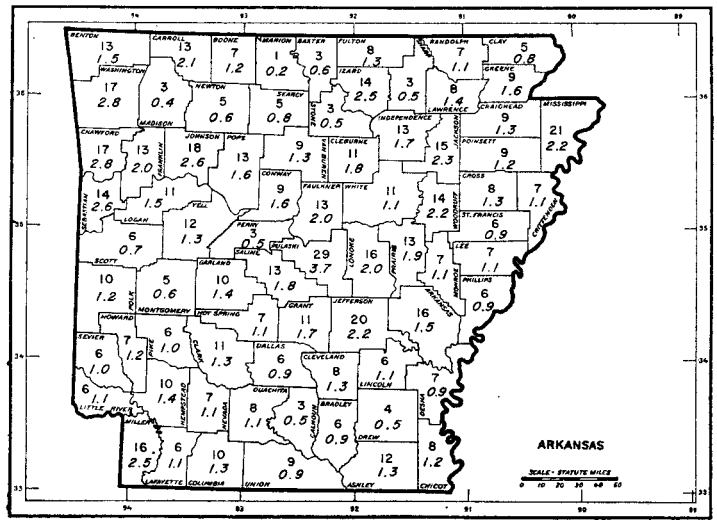

FIGURE 1.—Number of tornadoes (upper number) and number of tornadoes per 100 sq. mi. (lower number) for each county in Arkansas, 1923–1955.

1823, 1830, and 1840 [2] are the only tornadoes for which mention could be found prior to 1853. There is, however, indirect evidence that many tornadoes occurred in the State during the period from 1829 through 1854 [3]. Although not used in this report, the "hurricane" or "cyclone" paths of the 1829–54 period, as noted on early General Land Office survey maps, were very probably caused by tornadoes.

In Arkansas most tornadoes are ¼ mile or less in width, averaging about 350 yards. Very few have been as much as a mile wide, and there are only three on record in the State with widths of from 2 to 2½ miles. Paths of most tornadoes in Arkansas are short, although there have been a number of very long paths. Seven have been 100 miles or more in length. Many of these longer paths, however, were not continuous on the ground throughout the entire course of the tornadoes. On the average, less than 10 square miles out of the 53,850 square miles in the State are affected by tornadoes each year. This makes the chance for a given spot being hit by a tornado very small indeed. Conversely, some areas have been hit more than once, and a few places several times.

Figure 2 shows the tornado paths in Arkansas from 1879 to October 12, 1955, plotted on a topographic base

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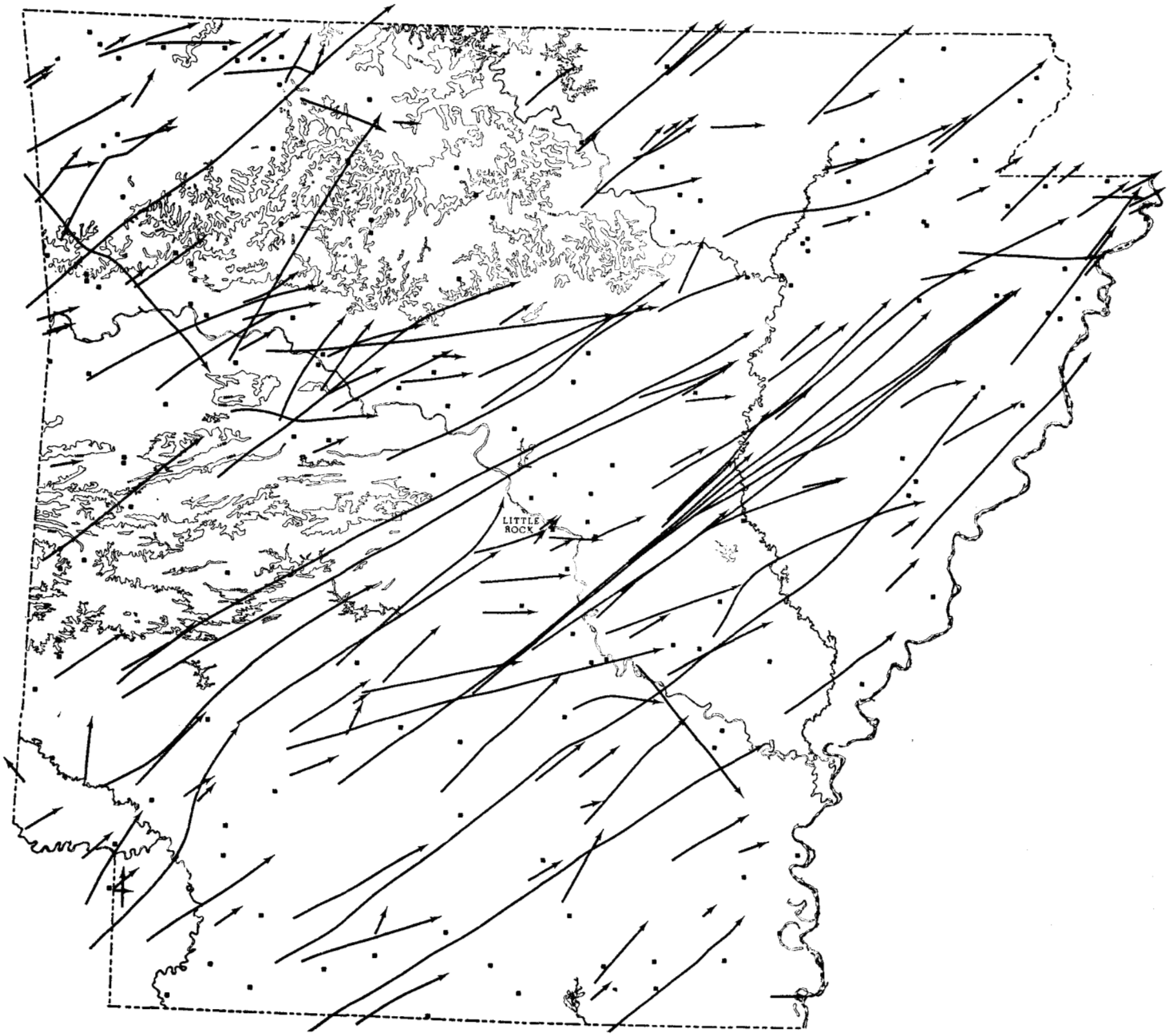

FIGURE 2.—Tornado paths in Arkansas, 1879 to October 12, 1955. Small squares show occurrences whose paths were too short to track. Thin solid lines are the 1,000- and 2,000-ft. contours.

map. Locations of tornadoes with short paths are shown by squares while longer paths are shown by lines with arrows indicating the direction of movement. Despite the irregular topography of much of the State, the prevailing direction of most tornadoes is from southwest to northeast; in fact the percentage of tornadoes from the southwest in Arkansas is 71.6 as compared with the nationwide average of 61.4 percent from that direction [4]. From figure 2 there appears to be a concentration of tornado occurrences in an area in east-central Arkansas a short distance east of the boundary of the Gulf Coastal Plain. To the north and west of the Gulf Coastal Plain boundary, which extends across the State from the southwest to northeast, the land is higher and hilly, while to the south and east of this line lies the low delta country. Another concentration of tornado paths seems to be in the Arkansas River Valley to the north of the Arkansas River and south of the Boston Mountains and the higher elevations of the Ozarks. These areas of seemingly greater tornado frequency were mentioned by Cole [5] in 1927. A number of tornadoes since that time have occurred in these same areas, including the most destructive day on record in the State, March 21, 1952, when three tornadoes left in their long paths, 111 dead, 772 injured, and 6¾ million dollars

property damage. While it appears some areas in the State may be more subject to tornadoes than others, it is believed the number of tornadoes of record so far is insufficient for an adequate sample on which to base definite statements.

There are 38 cities or towns in Arkansas, where, or near where, three or more tornadoes have occurred since 1879. In the Little Rock area there have been 12 tornadoes; 9 of these occurred since 1879, and 3 more than a century ago. The tornadoes in the Little Rock area since 1879 struck in different sections of the city although the storms of 1916 and 1923 were close together and covered the same ground for part of their paths. Despite the number of tornadoes on record in Little Rock, only a small part of the city area has actually been affected. In the Fort Smith area, 8 tornadoes have been reported, including the one that caused 52 deaths and much damage on January 12, 1898. At least two of these tornadoes struck in exactly the same section of downtown Fort Smith. Texarkana has experienced 8 tornadoes, three of which struck in the College Hill section in the eastern part of the city.

REFERENCES

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4. U. S. Weather Bureau, Climatological Services Division, "Tornado Occurrences in the United States," *Technical Paper No. 20*, September 1952.
5. Harvey S. Cole, "Tornadoes in Arkansas, 1879–1926," *Monthly Weather Review*, vol. 55, April 1927, pp. 176–182.